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An elevator apparatus

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None

(58) Field of search
B8L

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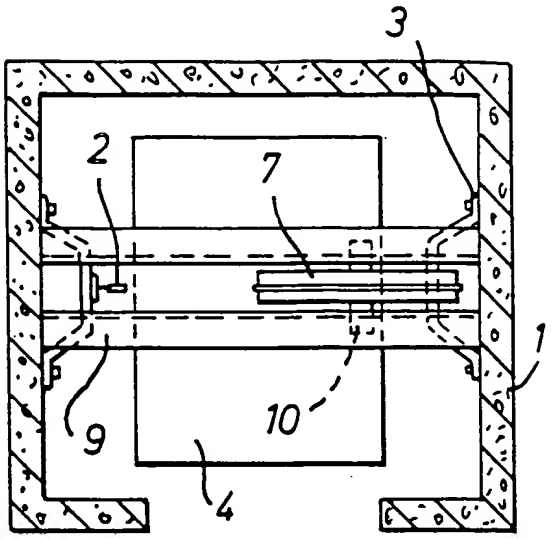

FIG. 2.
PRIOR ART

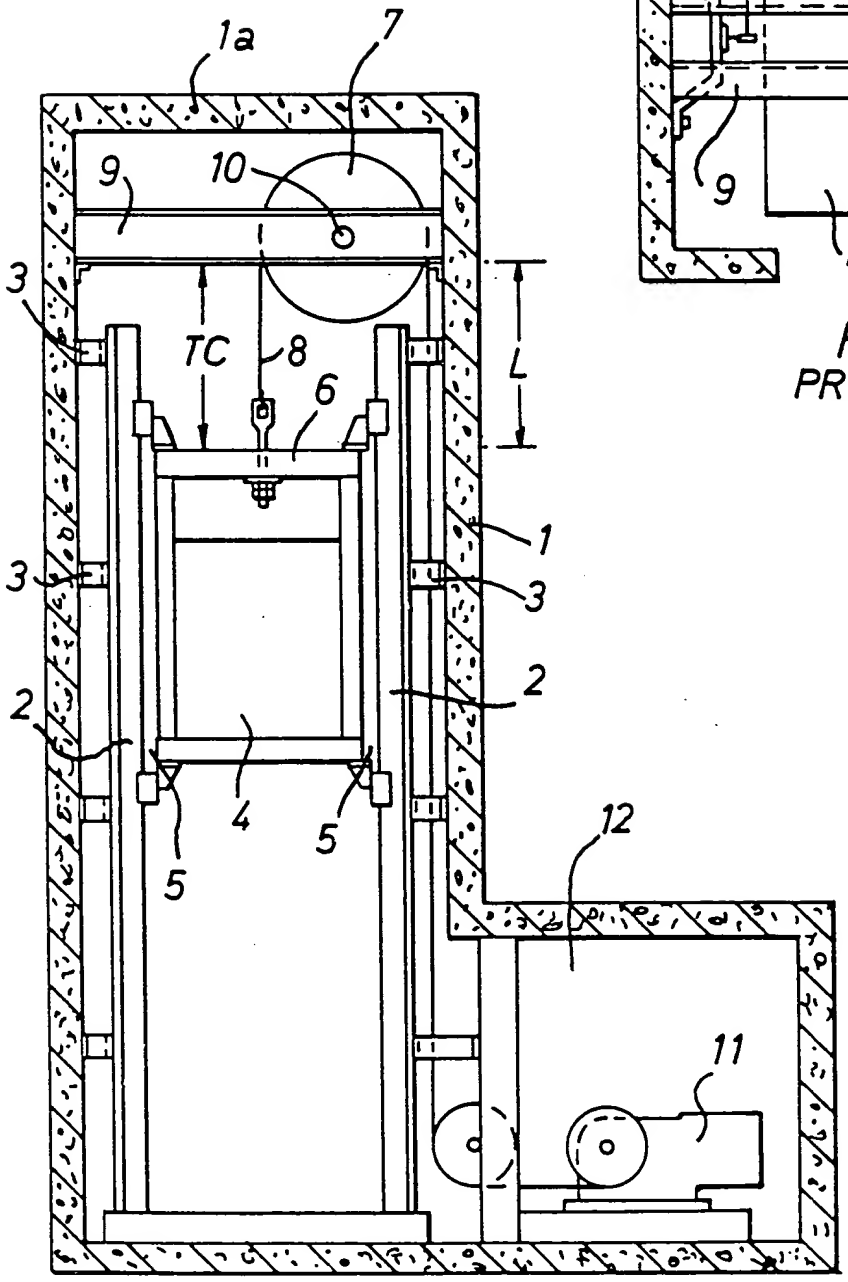

FIG. 1.
PRIOR ART

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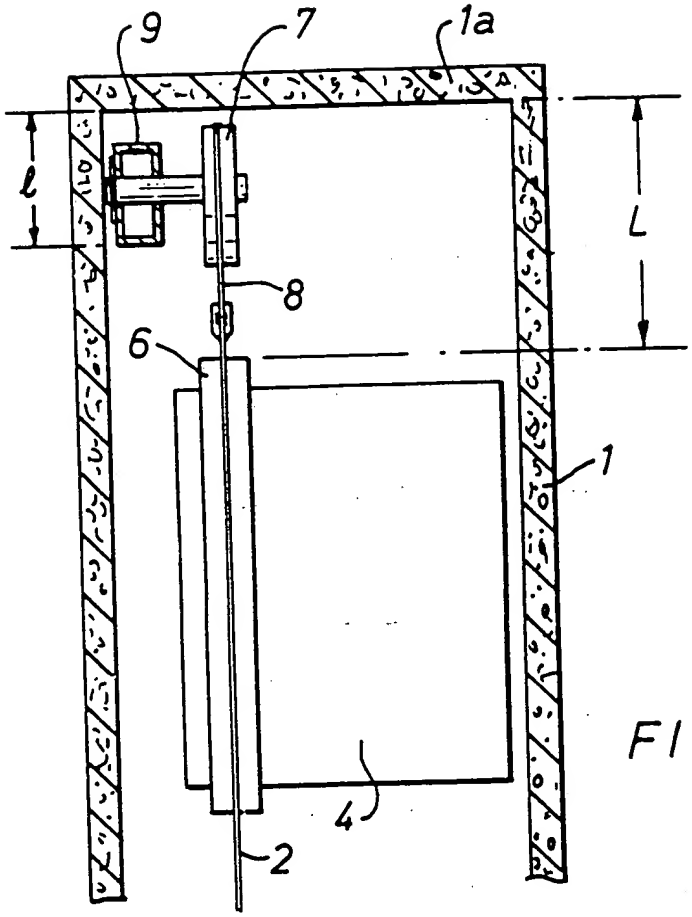

FIG.3.

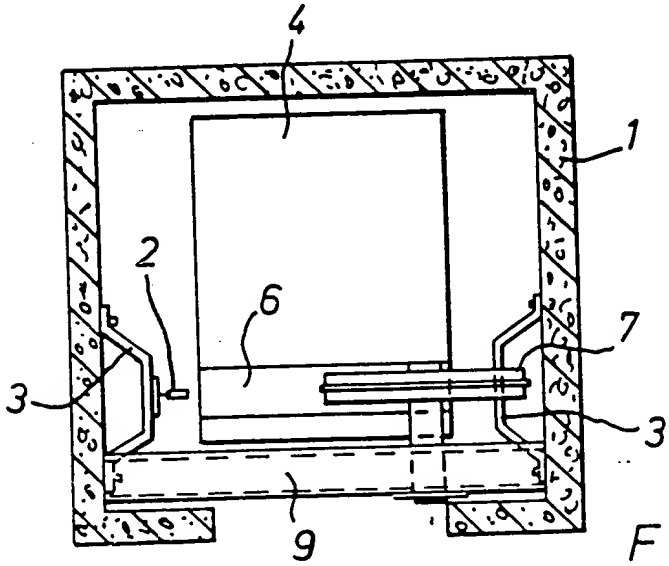

FIG.4.

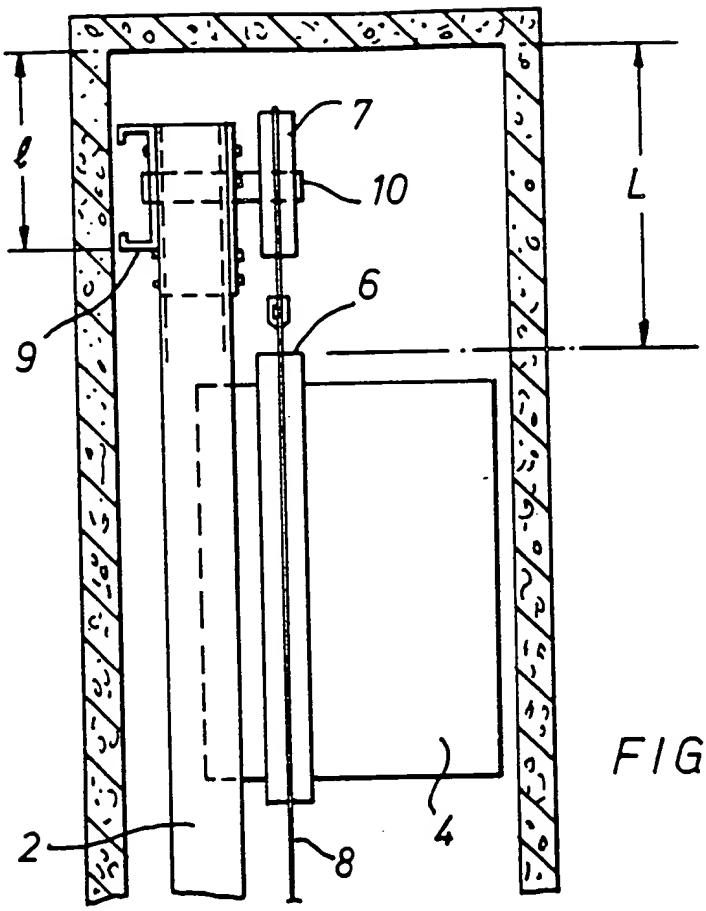

FIG.5.

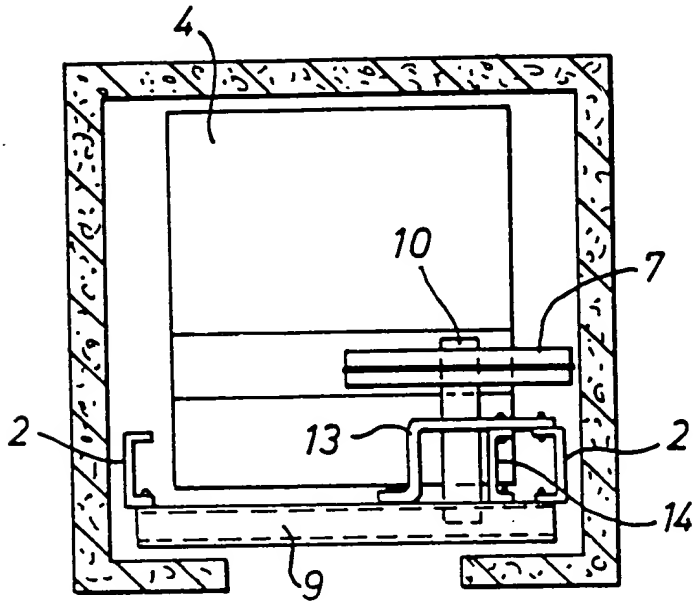

FIG.6.

AN ELEVATOR APPARATUS

The present invention relates to an elevator apparatus and more particularly to an elevator apparatus which allows a decrease in the top clearance between the top of the hoistway and the ceiling portion of the cage.

First, for a clearer understanding of the present invention, a conventional elevator apparatus will be explained with reference to Figs. 1 and 2 of the accompanying drawings. In Figs. 1 and 2, reference numeral 1 is a hoistway, having generally a rectangular cross section, for an elevator, 2 are guide rails vertically installed within the hoistway 1 parallel with each other and secured to the confronting walls thereof by a plurality of brackets 3, 4 is an elevator cage adapted to be moved up and down along the guide rails 2 through a pair of spaced vertical columns of the car sling securing the cage 4 therebetween, 6 is an upper beam of the car sling which securely fastens the vertical columns 5 at their upper ends, 7 is a deflector sheave adapted to lead a hoisting wire rope 8, one end of which is secured to the upper beam 6 at substantially its midportion, to a driving means (to be described later) after the upwards direction of the rope 8 is changed through 180° by the deflector sheave 7, 9 are a pair of spaced support beams secured at their ends to the confronting walls of the hoistway 1 to rotatably support the sheave 7 therebetween

by a shaft 10, and 11 is the driving means provided with a number of sheaves and adapted to move the cage 4 through the hositing wire rope 8, the driving means 11 being housed within a chamber 12 integrally formed with the hoistway 1 at its lowermost portion.

The support beams 9 to support the deflector sheave 7 are disposed within a top celarance formed between the under surface of the top 1a of the hoistway 1 and the ceiling portion of the cage 4 when it has been moved to the uppermost position, and they are mounted at their ends to the confronting walls of the hoistway 1 substantially at right angles thereto at substantially their midportion as shown in Fgi. 2. In this case, the distance L between the lower surfaces of the upper beams 9 and the upper surface of the support beam 6 of the vertical columns of the sling of the cage 4 is required by law to be no smaller than a minimum predetermined dimension. This is so that a person engaging in equipment maintenance and imspection of the elevator apparatus is assured of a space to get on the ceiling of the cage 4 when he operates. Thus, since a space, or a top clearance for the maintenance and inspection is necessitated at the top portion of the hoistway 1 in addition to the space necessary for the up and down movement of the cage 4 this space for maintenance and inspection necessarily protrudes beyond the roof of the uppermost floor

of a building. Such a protrusion is particularly noticeable and undesirable in low-storied houses such as a three-or four-story house, since it can prevent the sun from shining on adjoining buildings. The protrusion thus constitutes an obstacle to the installation of elevators in low-storied buildings.

SUMMARY OF THE INVENTION

It is a principal object of the present invention to provide an elevator apparatus which can eliminate the difficulties in a conventional elevator apparatus as described above.

It is another object of the present invention to provide an elevator apparatus which can decrease the space required between the top portion of the hoistway and the ceiling portion of the elevator cage when it moves to its upper most portion.

It is a further object of the present invention to provide an elevator apparatus wherein in a low storied building in which an elevator is to be installed the portion to protrude from the building roof is maintained at a minimum or even eliminated.

In accordance with the present invention, an elevator apparatus having a cage adapted to be suspended from a deflector sheave disposed near the top portion of a hoistway is provided, the support beams for the deflector sheave being securely

arranged between the confronting side walls of the hoistway nearer the wall of the hoistway in which entrance openings are formed than is the plane of the entrance side of the cage.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other objects of the present invention will become more readily apparent upon reading the following specification and upon reference to the accompanying drawings, in which:

Fig. 1 is an elevation of a conventional elevator apparatus in longitudinal section;

Fig. 2 is a plan view of the elevator apparatus shown in Fig. 1 in cross-section;

Figs. 3 and 4 are views similar to Figs. 1 and 2, respcectively, of one embodiment of the present invention; and

Figs. 5 and 6 are views similar to Figs. 1 and 2, respectively, of another embodiment of the present invention.

Throughout these drawings the same or similar parts are affixed with the same reference numerals.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to Figs. 3 and 4 of the accompanying drawings, one embodiment of the present invention is shown which differs from the conventional elevator apparatus shown in Figs. 1 and 2 in that the support beams 9 to rotatably support

the deflector sheave 7 are secured to the confronting walls of the hoistway 1 in such a manner that they are laterally displaced towards the wall of the hoistway 1 in which entrance openings are formed. That is, the support beams 9 are secured to the confronting walls of the hoistway 1 at substantially the same height as in the conventional elevator apparatus, but nearer to the wall in which the entrance openings for the cage 4 are formed. Thus, as shown in Fig. 3 the support beams 9 are disposed nearer to the wall of the hoistway 1 in which the entrance openings are formed than is the entrance side of the cage 4. At the same time, the deflector sheave 7 and the guide rails 2 are also displaced towards the entrance opening side of the cage 4, so that a space is formed between said deflector sheave and the wall of said hoistway opposite to said wall in which said entrance openings are formed, said space being available for maintenance and inspection of said elevator apparatus. Owing to this arrangement, the dimension L of the space or top clearance necessary for the maintenance and inspection of the elevator apparatus becomes the space between the under surface of the top portion of the hoistway 1a and the upper surface of the upper beam 6. Therefore, as shown in Fig. 3 the

height of the hoistway 1 can be decreased by an amount ℓ, equal to the distance between the top portion of the hoistway 1a and the lower surfaces of the support beams 9. This means that the protrusion of the hoistway 1 above the roof of a building is less than for a conventional elevator, such as shown in Figs. 1 and 2, by this amount ℓ. It will be understood that the vertical support frames of the cage sling and the upper beam 6 are also displaced towards the entrance wall of the hoistway or shaft, as are the guide rails 2.

Figs. 5 and 6 show another embodiment of the present invention.

In this embodiment as well the support beams 9 for the deflector sheave 7 are arranged nearer the wall of the hoistway 1 which the entrance side of the cage 4 confronts. However, this embodiment differs from the previous one in that the support beams 9 are secured at their ends to the guide rails 2, 2 at their upper ends. With this constitution, the guide rails 2, 2 are allowed to be installed from the entrance side of the wall of the hoistway 1, eliminating the use of scaffolds as necessitated in the installation of a conventional elevator apparatus. Therefore, the costs of instalment of the elevator apparatus are decreased. Further, by

mounting the guide rails 2, 2 at the entrance side, the torque applied to the cage 4 is resisted by these guide rails 2, 2. The deflector sheave 7 is rotatably supported by the shaft 10 which is mounted on the support beams 9 and on fittings 13, 14 secured to the support beams 9.

It is to be understood that although certain forms of this invention have been illustrated and described, it is not limited thereto except insofar as such limitations are included in the following claims.

CLAIMS

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1. An elevator apparatus wherein the cage is adapted to be moved up and down within a hoistway by a hoisting wire rope which is reeved around a deflector sheave rotatably mounted at the upper portion of said hoistway with one end of said hoisting wire rope being secured to the top of said cage and the other end being connected to a driving means positioned at a lower level than the deflector sheave, the deflector sheave being rotatably supported at said upper portion of said hoistway by at least one support beam arranged between the opposing walls of said hoistway and parallel with the wall thereof in which are the entrance openings, said support beam(s) being located nearer to said wall than is the hypothetical elongated plane of the entrance side of said cage.

2. An elevator apparatus as claimed in claim 1 in which said support beam has or beams have the ends thereof fixedly secured to said opposing walls of said hoistway by any suitable means.

3. An elevator apparatus as claimed in claim 1 wherein said support beam has or beams have the ends thereof firmly secured to guide rails at the upper ends of the rails, said guide rails being disposed vertically within said hoistway parallel with and spaced from said opposing walls thereof.

4. An elevator apparatus as claimed in claim 1, 2 or 3 wherein said cage engages guide rails disposed vertically within said hoistway parallel with and spaced from said opposing walls thereof so that said cage is moved up and down guided by said guide rails, and said deflector sheave and said guide rails are displaced towards said wall of said hoistway in which said entrance openings are formed in the same way as said support beam(s).

5. An elevator apparatus as claimed in claim 4 wherein a space is formed between said deflector sheave and the wall of said hoistway opposite to said wall in which said entrance openings are formed, said space being available for maintenance and inspection of said elevator apparatus.

6. An elevator apparatus as claimed in claim 4 or 5 wherein said cage is provided around its outer surface with a pair of vertical support frames and an upper beam connected at both ends to said vertical support frames at their upper end portions, whereby said vertical support frames and said upper beam are displaced towards said wall of said hoistway in which said entrance openings are formed in the same way as said guide rails are.

7. An elevator apparatus substantially as herein described with reference to Figs. 3 and 4 or Figs. 5 and 6 of the accompanying drawings.